TO: Kristie Warr

FROM: Rick Haaker, CHP, CIH

SUBJECT: Review of Las Conchas Fire Work Order 11-07001

DATE: 7/27/2011

This is an update to a memo that was dated 7/19/2011. It clarifies the basis for assigning the data qualifiers JH and JL as described below. Data transmitted prior to 7/26/2011 had the qualifiers JH and JL reversed on a small number of results. No records were affected for this particular sample set. The XLS format data file referenced as an attachment to this memo corrects these assignments where appropriate. Also this memo transmits additional subsidiary calculations for "Net Concentration" and "Net Concentration Propagated Error."

The data were reviewed for accuracy, completeness, and any apparent issues. During data review a qualifier "UB" was assigned if the activity result is less than five times the activity result of the method blank. A "UB" qualifier denotes that an analyte is non-detect due to lack of activity relative to a blank concentration. Unused filters from the same lot as the sample filters were used as the method blank. The analytes in Table 1 were detected in the method blank, and all samples are affected.

Table 1. Analytes detected or tentatively detected in the method blank and data qualifiers based on the blank.

BlanksWithDetectedOrEstimatedActivity	
Isotope	**Assigned Qualfier**
GROSS ALPHA	J
GROSS BETA	
PU-238	J
PU-239	J
TOTAL SR	
U-234	
U-235	J
U-238	

Data without a UB qualifier was further reviewed.

A "U" was assigned to the Assigned Qualifier column when result was less than 50% of the MDA. In this case the analytical result was assigned to be one-half of

the MDA in the "ValidatedResult" column. The validated result should be considered an upper bound estimate in this case.

A “J” was assigned if the result was between 0.5 of the MDA and the MDA. The validated result is the reported result. The validated result represents an estimated value in this case.

A “JH” or “JL” would be based on percent recovery (the "RadioPercentRec", and “GravPercentRec” columns of the Eberline Services report. Below 70% would result in assignment of a JH to denote that the reported result is estimated with more uncertainty than usual, and with a potential positive bias. Recoveries above 130% would result in assignment of a JL to denote that the reported result is estimated with more uncertainty than usual, and with a potential negative bias.

Table 2 lists samples that exhibited percent recoveries outside of the acceptance range. These samples all carried a “U” or “UB” qualifier.

Table 2. Samples with recoveries outside of the acceptance range.

NonAcceptanceRecoveries		
Isotope	**ClientID**	**RadioPercentRec**
PU-238	A005-110628-ST01	68.04
PU-238	A002-110629-ST02	69.69
PU-239	A005-110628-ST01	68.04
PU-239	A002-110629-ST02	69.69

The assigned data qualifiers are found in column “AssignedQualifier”.

The effective air volume for the various analytes of the various air samples in cubic meters are provided in the column “AliquotNetEquiv”.

Note that the blank results are in pCi/m^3. The volume that Eberline Services assigned to the blanks for a given analyte are the average of the effective volumes for the samples in the sample set for that analyte.

Air volumes that were collected in this sample set tend to be lower than ideal for environmental samples, being in the range of 5 to 78 cubic meters.

The period of time between collection of air samples and gross alpha/beta counting was short, ranging from two to three days, so those results are likely to include an activity contribution due to the presence of radon daughters.

The initial EDD provided by Eberline Services contained self-contradictory sample dates and some did not agree with the collection dates provided on the chain of custody No: 6-063011-172300-0001. Some samples had two different sample dates listed in the EDD as indicated in Table 3. I understand that these were corrected by Weston Solutions at the time the data was loaded into SCRIBE, or by issue of a revised EDD by Eberline Services.

Table 3. List of Samples and Sample Dates.

SampleDates	
ClientID	SampleDate
A001-110629-ST02	6/28/2011
A001-110629-ST02	6/29/2011
A003-110629-ST02	6/28/2011
A003-110629-ST02	6/29/2011
A005-110629-ST02	6/28/2011
A005-110629-ST02	6/29/2011
A006-110629-ST02	6/28/2011
A006-110629-ST02	6/29/2011

Per an email exchange with the sample team leader, two corrections are needed to the chain of custody: "A001-110628-2281-ST01" should be changed to "A002-110628-2281-ST01", and its sample location should be changed to A002.

In addition the sampling team leader confirmed that sample "A001-110629-ST02" was collected at location A003.

No other discrepancies were found in the transcription of sample IDs or sample volumes from the chain of custody to the EDD.

Net Concentration

Eberline Services reported concentration and uncertainty results which were corrected for instrument background. They also reported concentration and uncertainty results for the method blank. They did not report "net concentration", which is the sample result minus the result for the method blank, probably because their written procedure does not include that calculation and it was not specified in the Purchase Order. The "Net Concentration" is the concentration result reported by Eberline Services corrected for the contribution of the method blank. The net concentration may be calculated from Eberline Services data as indicated in equation 1.

Equation 1.

Net Concentration = (Result * Sample Volume – Blank Result * Blank Volume)/Sample Volume

In equation 1 the *sample volume* is the sample air volume from the chain of custody times the fraction of the sample filter allocated to the particular analysis. The blank volume is the average of the *sample volumes* for all samples submitted on a particular chain of custody times the fraction of the sample filter allocated to the particular analysis. Negative net concentrations were assigned a concentration of zero after this calculation.

Net Concentration Propagated Error

The propagated errors "Uncertainty" in the Eberline Services report are, according to their written procedure, based on a 95% confidence interval. The Net Concentration Propagated Error (NPCE) was calculated as indicated in equation 2.

Equation 2.

$$NPCE = [[(\text{Uncertainty Result} * \text{Sample Volume})^2 + (\text{Uncertainty Blank Result} * \text{Blank Volume})^2]^{0.5})/\text{SampleVolume}$$

The Net Concentration Propagated Error result is in a column entitled ErrorNet in the supplemental excel data file, which is attached.

Minimum Detectable Activity (MDA)

The equations for MDA in the Eberline Services written procedure assume that the count time for the sample and the background counts are the same. The results for background count rate in the EDD appear to be truncated to one significant digit, so it is unlikely the MDA results reported by Eberline Services can be replicated exactly by an independent calculation.

Percent Recovery of Tracer

The denominators of the concentration result, MDA, and uncertainty equations in the Eberline Services written procedure include a factor for percent recovery of the tracer. The alpha sepectroscopy results reported by Eberline Services in the EDD should incorporate this factor.

References

AP-018 Operation of the Alpha Spectroscopy System, Eberline Services Oak Ridge Laboratory Analytical Procedure, October 31, 2010.

Attachment

LasConchas-11-07001.accdb supplement7-27-11.XLS